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(54) **MICROWAVEABLE BAKERY PRODUCT**

MIT MIKROWELLEN ZUBEREITBARE BÄCKEREIPRODUKTE

ARTICLE DE BOULANGERIE UTILISABLE DANS UN FOUR A MICRO-ONDES

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**EP 0 505 477 B1**

## Description

### Field of the Invention

5 [0001] The present invention relates to starch-based food products and more particularly to bakery type foods to be heated or cooked in a microwave oven.

### Background of the Invention

10 [0002] Microwave cooking is based on the ability of microwaves to interact with the components of a food product and generate heat energy. The amount of interaction and subsequent heat that is generated is related to the composition of the food and the specific heat of each ingredient. Food molecules which carry a dipole electrical charge will vibrate as they align themselves with the rapidly fluctuating electric field. This causes heat of friction within the molecules. Since water carries a dipole charge, foods containing high contents of water will generate a great deal of heat due to the reactivity of water in a microwave.

15 [0003] Although microwave cooking is greatly influenced by the dielectric properties of ingredients, it is also affected by the food product's physical state, density, size, shape and thickness.

20 [0004] The greater a food product's density, the greater the microwave energy absorption and the lower the microwave penetration depth. Also, the shape of food and uneven patterns in a microwave can result in nonuniform temperature distributions.

25 [0005] In intermediate to low moisture foods such as baked goods, dramatically different patterns of starch transformation can exist which normally are responsible for poor textures such as toughening and cracking. This is known as staling. The primary problem is that dehydration cannot occur at the surface since the water within the product is continually being converted to steam and migrating out, causing evaporative cooling and condensation at the surface. This provides a wet or soggy surface texture. Water boils at 100° C. and its heat exchange capability diminishes as it evaporates as steam. The ability of ingredients to evenly distribute heat in a microwaveable bread will depend on both their specific heat and their relationship with water.

30 [0006] When starch imbibes water during gelatinization, increased heating rates will occur in that location due to interaction of microwave radiation with water. Because more intense heat results from microwave energy, starch's tolerance to textural breakdown is narrowed.

[0007] A critical moisture level exists for most starches below which gelatinization will not take place. This is usually around 30%. Gelatinized or swollen starch binds less water to its structure; therefore, more water is free to respond to the alternating microwave field resulting in heat build up and undesirable moisture migration.

35 [0008] Microwave heating of bread products results in the problem of rapid staling or toughening. This is most likely due to the non-uniform heating and increased range of starch gelatinization which takes place at the moisture level of the bread. Toughening or harsh chewiness of a microwaved bread product is attributed to accelerated staling, which is related to starch recrystallization and moisture migration.

[0009] Tests were conducted on commercially available precooked hamburger buns to determine the extent of moisture migration. The results were as follows:

TABLE I

Commercial Hamburger Buns			
Location of Moisture	% Before Microwaving	% After Change	
Top Third	29.02	35.15	+ 6.13
Middle Third	34.67	34.86	+ 0.19
Bottom Third	36.31	29.99	- 6.32
Total Moisture	100.00	100.00	
Total moisture loss was 13.12%			

55 [0010] A noticeable staling and toughening of the product was noted.

[0011] US Patent N° 4857353 discloses a method for preparing flour-based products for heating in a microwave oven, and is particularly concerned with the provision of dry culinary mixes for the preparation of microwave layer cakes.

## General Description of the Invention

[0012] The present invention relates generally to preparation of bread products which are resistant to staling and toughening during microwave heating. Bakery products prepared according to the present invention also have reduced moisture migration during microwave heating of the bakery products. For example, the following Table II shows the effect of microwave heating of hamburger buns prepared according to the present invention. The buns were prepared as set forth in Example IV. Such testing was carried out in the same manner as the testing shown in Table I. Table II shows substantially less moisture migration with the present invention in contrast to that of commercially available buns.

[0013] The bakery products prepared according to the present invention may have an elevated fat content without fat migration in the product. The product includes generally non-fat dry milk and egg protein. The bakery product prepared according to the present invention further includes various other ingredients typically found in bakery products. The term "bakery products" as used herein means: a processed food product made from grain flour and various other ingredients, prepared for consumption through the process of baking. The product is usually offered for sale, "ready to eat", but may be sold in an unbaked or semi-baked state. Typical bakery products include: bread, cake, pie, sweet rolls, buns, doughnuts, cookies, crackers, ice cream cones, and pretzels.

TABLE II

Hamburger Buns were prepared according to the present invention as set forth in Example IV. The buns after cooling to room temperature were heated in a microwave oven. Tests measuring moisture migration were measured as in Table I.			
Location of Moisture	% Before Microwaving	% After Change	
Top Third	29.08	32.77	+ 2.69
Middle Third	36.82	37.49	+ 0.67
Bottom Third	<u>34.10</u>	<u>30.74</u>	<u>- 3.36</u>
Total Moisture	100.00	100.00	
Total moisture loss was 5.47%			

## Detailed Description of the Present Invention

[0014] The present invention contemplates a method for preparing a premix that may be included in conventional bakery product production.

[0015] In accordance with the present invention there is provided a method for preparing flour-based products to be heated in a micro-wave oven in which a protein material selected from the group consisting of egg protein, milk protein and soy protein is first combined with shortening and the protein/shortening combination is then mixed with flour to form a premix including 4.5 to 25 parts protein, 7 to 55 parts shortening, and 14 to 55 parts flour. The terms "parts", "percents" and the like as used herein will refer to "parts, percents and the like by weight".

[0016] A preferred premix may be prepared according to the present invention for making flour-based products for heating in a microwave oven by combining by weight from 0 to 20 parts dry milk solids, 7 to 55 parts of shortening, and 0 to 5 parts dried whole eggs. The protein material is present in an amount of from 4.5 to 25 parts. Then 22 to 55 parts high gluten flour and 0 to 20 parts dextrose are added. The premix is prepared by first combining the dry milk solids, eggs and shortening to absorb the shortening into said protein materials e.g. milk solids and eggs. Then the flour is added to the combination.

[0017] The invention also provides a method for preparing a complete mix for flour-based products to be heated in a microwave oven in which a protein material selected from the group consisting of egg protein, milk protein and soy protein is first combined with shortening and the protein/shortening combination is then mixed with flour and other dry ingredients to form a dry mixture including 4.5 to 25 parts protein, 7 to 55 parts shortening, 14 to 55 parts flour, yeast, and finally water is added to the dry mixture in an amount of 20 to 30 parts, all amounts being expressed as parts per 100 of the complete mix. The complete mix is prepared by first combining the protein and shortening to absorb the shortening into the protein and then adding the flour and other dry ingredients to the protein/shortening combination.

[0018] The flour in the present invention may be any finely comminuted meal of any cereal grain or edible seed or mixtures as are typically used in baking. Examples of such flours include wheat flour, barley flour, rye flour, corn starch, and corn flour. Synthetic flours may be used which include such materials as starch in combination with soy protein. Wheat flours are the most typical flour used in baking and may include hard red spring, hard red winter, soft red winter

and white winter and spring. The protein content of such flours typically varies from about 7% to about 14%. Any flour material that is suitable for use in baking may be used in the present invention.

[0019] The protein material used in the present invention will typically be dry milk solids and/or eggs. Various other proteins however, may be used such as soy isolate and other high protein materials. Egg protein may include dried whole eggs, fresh eggs and the like.

[0020] Shortening may be any oil or higher melting fat which is suitable for use in baked products. Shortenings contribute flavor and texture to the baked goods. Butter and/or margarine is suitable as the shortening. The present shortenings may be solid or plastic as well as liquid or semi-fluid. Glyceride shortenings derived from animal vegetable fats and oils including synthetically prepared shortenings. The glyceride may contain saturated or unsaturated long chain acyl radicals having from about 12 to about 22 carbon atoms generally obtained from edible oils and fats such as corn oil, cottonseed oil, soybean oil, coconut oil, rapeseed oil, peanut oil, olive oil, palm oil, palm kernel oil, sunflower seed oil, wall flower oil, lard, tallow and the like. Some preferred shortenings are soybean based shortenings or oils, hydrogenated soybean-based shortening or oil, corn oil, palm oil, hydrogenated palm oil, lard and tallow oils. Crisco™ brand shortening is commercially available from the Proctor and Gamble Company. Dry shortening may be used such as Beatrice™ which has a 70% to 72% fat level.

[0021] The present products will typically include a leavening agent such as yeast or chemical leavening agents. The latter includes such things as baking soda e.g. sodium potassium or ammonium bicarbonate alone or in combination with a baking acid. Preferably sodium aluminum phosphate, monocalcium phosphate, dicalcium phosphate or mixtures thereof. The leavening material will be used in an amount suitable to provide the desired degree of leavening.

[0022] Of course, in the final product, various other materials may be included such as flavorings e.g. spices, sweeteners, chocolate and the like.

#### Example I

[0023] Three premixes, A, B, C were prepared according to the present invention by combining the ingredients set forth in the following Table. The protein, e.g. the non-fat dry milk solids and the whole eggs were first combined. Next, the shortening was blended into the protein. The remaining ingredients were then combined with the resulting mixture.

Raw Materials	Parts by Weight		
	A	B	C
High gluten flour	55.0	31.74	14.78
Margarine	7.0	38.08	50.00
NFDM	4.0	4.76	20.0
Whole eggs	2.0	4.76	5.0
Sugar	0	3.17	4.0
Water	26.8	13.65	5.0
Cornstarch	1.0	0.63	0.2
Centrobake 100L*	0.1	0.02	0.01
Salt	4.0	3.17	1.0
Microcrystalline cellulose	0.1	0.02	0.01
	100.00	100.00	100.00

\* A mixture of distilled monoglycerides and lecithin marketed by Central Soya Company.

[0024] The premix was subsequently used in preparing bakery products as hereinafter described.

#### Example II

[0025] Three premixes, A, B, and C were prepared according to the present invention by combining the ingredients

set forth in the following table. The non-fat dry milk solids and the whole eggs were first combined. Next, the shortening was blended into the protein, e.g., milk solids and eggs. The remaining ingredients were then combined with the resulting mixture.

Raw Materials	Parts by Weight		
	A	B	C
Dried shortening	40.00	53.87	55.0
NFDM	0.1	0.04	-
Dried whole eggs	1.0	1.49	3.0
Cornstarch	1.0	0.79	0.2
Centrobake 100L	0.1	0.03	0.01
Salt	5.0	3.97	2.0
Microcrystalline Cellulose	0.1	0.03	0.01
Dextrose	-	0.00	-
Sugar	0.1	0.03	-
High gluten flour	52.6	39.76	<u>39.78</u>
	<u>100.00</u>	<u>100.00</u>	100.00

[0026] The premix was used as hereinafter described.

### Example III

[0027] Three premixes were prepared according to the present invention by combining the ingredients set forth in the following table. The non-fat dry milk solids and the whole eggs were first combined. Next, the shortening was blended in. The remaining ingredients were then combined with the resulting mixture.

Raw Materials	Parts by Weight		
	A	B	C
Dried shortening	25.0	42.46	50.0
NFDM	10.0	6.73	3.0
Dried whole eggs	1.0	3.89	5.0
Cornstarch	2.0	1.07	0.2
Centrobake 100L	0.5	0.03	0.02
Salt	1.2	0.85	0.3
Microcrystalline Cellulose	0.3	0.03	0.01
Dextrose	20.0	17.12	15.0
Sugar	-	0.0	-
High gluten flour	<u>40.0</u>	<u>27.83</u>	<u>26.47</u>
	<u>100.00</u>	<u>100.00</u>	100.00

[0028] The premix was then used to prepare bakery products as hereinafter described.

#### Example IV

##### Hamburger Buns

5 [0029] Hamburger buns were prepared according to the present invention by combining the following ingredients. The ingredients are expressed as percent by weight.

	Control A	Control B	Present Invention	
			C	D
10 Flour	50.62	57.41	48.24	42.15
15 Water	32.82	32.86	22.86	22.86
Shortening	4.67	2.74	11.49	14.95
Sugar	5.61	0.86	1.36	1.36
Yeast	2.80	3.00	4.76	4.76
20 Milk Powder	1.82	0.60	3.73	4.72
Salt	0.93	0.90	0.27	0.34
Whole Egg Solids	0.93	0.20	1.23	1.56
25 Dextrose	-	0.86	5.40	6.85
Cornstarch	-	0.05	0.34	0.43
Centrobake 100L	-	0.50	0.01	0.01
Microcrystalline Cellulose	-	0.01	0.01	0.01
30 TOTAL	100.00	100.00	100.00	100.00

[0030] Hamburger buns were prepared by first combining the milk powder and whole egg solids. Next the shortening in Products C and D were combined with the milk powder and egg solids. The remaining dry ingredients were then combined with the protein/shortening mixture. In the case of Products A and B, all dry ingredients were combined and then the shortening was added. Finally, the water was added with sufficient mixing to develop the dough. The dough for each of the products were divided into pieces sufficient to provide a finished hamburger roll of two ounces. Following baking the hamburger rolls were cooled to room temperature. Later, the rolls were reheated in a microwave. Substantial staling was noted with respect to baked Products A and B. In the case of baked Products C and D, minimal staling was noted and the rolls had characteristics substantially identical to fresh baked rolls. Data from Instron testing according to standard methods verified the observations regarding staling. The Instron testing of Product A was about 180 Kg of force before microwaving and slightly over 500 Kg of force following the microwave heating. The Instron testing of Product D was 247 Kg of force before microwaving and about 140 Kg after microwave heating.

#### Example V

##### Cooked Pizza Crust

50 [0031] Four pizza crust products, e.g. Products A, B, C and D, were prepared as hereinafter described. Products A and B were conventional pizza dough products and Products C and D were prepared according to the present invention.

	A	B	C	D
55 Flour	65.77	63.79	52.12	48.15

(continued)

	A	B	C	D
Water	29.43	29.03	29.03	29.03
Yeast	2.40	3.00	5.22	5.30
Milk Solids	-	0.33	1.41	1.95
Shortening	0.60	2.37	10.41	14.22
Sugar	0.60	0.44	0.44	0.45
Salt	1.20	0.90	0.86	1.19
Whole Egg Solids	-	0.08	0.32	0.45
Cornstarch	-	0.04	0.17	0.24
Centrobake 100L	-	0.01	0.01	0.01
Microcrystalline Cellulose	-	0.01	0.01	0.01
TOTAL	100.00	100.00	100.00	100.00

[0032] Products A and B were prepared by first combining all of the dry ingredients. Then the shortening was added and thoroughly combined. Products C and D were prepared according to the present invention by combining the milk solids and egg solids. The shortening was thoroughly combined with this protein mixture. Then the remaining ingredients were combined. The water was added to each of the dry mixtures and mixed to develop a suitable dough. The amount of mixing was the same for each of the products. The dough was separated into balls of appropriate size for a pizza. The dough balls were pressed in a pizza mold and cooked in an oven at 600° F. for ten minutes. The cooked pizza dough was filled with pizza toppings. The products were frozen and packaged. Later, the products were removed from the package and cooked in a 600 watt microwave oven on high temperature for 1.5 minutes. Significant staling was noted with the control Products A and B. Minimal staling was noted with the present invention e.g. Products C and D.

#### Example VI

##### White Bread - Normal

[0033] A white bread was prepared by combining the following ingredients. In the case of Products A and B, all dry ingredients were combined and the shortening was then added. With Products C and D, the milk powder and the egg solids were combined. The shortening was combined with this mixture and then the remaining dry ingredients were added.

	Control A	Control B	Present Invention	
			C	D
Flour	54.66	59.84	50.20	44.25
Water	32.98	31.88	21.88	21.88
Shortening	2.06	1.76	11.10	14.10
Sugar	4.12	1.64	3.23	3.76
Yeast	3.09	3.30	4.67	4.56
Milk Powder	2.06	0.57	3.61	4.59
Salt	1.03	0.20	0.25	0.32
Dextrose	-	0.51	3.18	4.04
Whole Egg Solids	-	0.19	1.19	1.52

(continued)

	Control A	Control B	Present Invention	
			C	D
Cornstarch	-	0.05	0.32	0.40
Centrobake 100L	-	0.05	0.32	0.40
Microcrystalline Cellulose	-	0.01	0.05	0.08
TOTAL	100.00	100.00	100.00	100.00

[0034] In each product, the water was added to the dry ingredients with sufficient mixing to properly develop the dough. The products were divided into portions appropriate for a loaf of bread. The portions were baked under the same conditions and resulted in quality loaves of white bread. Loaves of each product were cooled to room temperature and later heated under the same conditions in a microwave. Products A and B had noticeable staling while no staling was noted in Products C and D.

#### EXAMPLE VII

[0035] Example VI was repeated using soy protein isolate in place of the milk powder and whole egg solids in an equal amount by weight. Similar results were obtained.

#### EXAMPLE VIII

[0036] A premix was prepared according to the present invention using each of the following formulations.

	A	B
Dried shortening	25.00	52.00
Isolate soy protein	8.00	2.00
Dried whole eggs	-	5.00
NFDM	-	-
Cornstarch	2.00	-
Centrobake 100L	0.20	0.20
Salt	1.50	0.50
Microcrystalline cellulose	0.30	0.50
Dextrose	20.00	18.00
High gluten flour	41.50	21.98
	100.00	100.00

[0037] The soy protein isolate was combined with the dried whole eggs. The shortening was then combined. The remaining ingredients were then combined. The premix was found to be suitable for use in preparing various bakery products. The resulting products were suitable for microwave heating without noticeable staling.

#### EXAMPLE IX

[0038] Empanada dough for frying was prepared according to the following formulation.



Premix B from Example II	66.00 parts
H&R Flour	100.00 parts
Water	50.00 parts

[0039] A five pound batch was prepared by mixing the premix and flour. Water was added and mixed on high until the dough adhered together. This took approximately 5 minutes. Dough was rolled out to 1/16 inch in thickness and formed into shapes 2 inches in diameter. Each piece was filled with a meat filling, folded over and the edges were trimmed. The filled pieces were fried in oil at 350° F. for 2 minutes. The fried pieces were cooled for 1 hour, frozen and packaged. The frozen pieces were reconstituted in a microwave oven on high setting with a 600 watt oven for 40 seconds. Other frozen pieces were reconstituted in a conventional oven for 3 minutes at 300° F.

#### EXAMPLE X

[0040] Microwaveable Pie Dough was prepared having the following formulation.

	Parts by weight	
Premix B from Example I	78.2	31.74%
Water	38.8	15.75%
Shortening	29.4	11.93%
H&R Flour	100.0	40.58%

[0041] A 5 pound batch was prepared The premix was combined with water and set aside. Flour and shortening were mixed until the shortening formed small beads. In each case, the mixing was for 1 minute. The premix and the flour/shortening mixture were combined and mixed to develop the dough. The dough was refrigerated until the dough temperature was 40° F. The dough was sheeted out to the desired thickness, put into a pie pan, fruit was added, and dough sheet was added over the top. The pie was baked in an air impingement oven for 6 minutes at 400° F. with 200lbs steam. The baked pie was cooled, frozen and packaged. One such pie, e.g. a 5 inch pie, was reconstituted by heating in a microwave on high setting with 600 watt oven. Heating was for 5 minutes. Minimal staling was noted. Another such pie was reconstituted in a conventional oven by heating 10 minutes at 300° F.

#### EXAMPLE XI

[0042] Microwaveable egg roll doughs were prepared according to the following formulation.

	Per cent	Parts by weight
Premix B Example II	32.51	66.00
H&R Flour	49.26	100.00
Dried egg	1.97	4.00
Water	16.26	33.00

[0043] First the premix, eggs and flour were combined with thorough mixing. Then the water was added with thorough mixing to provide a developed dough. The dough was sheeted to provide egg roll skins which was filled and deep fat fried.

### EXAMPLE III

[0044] Microwaveable croissants are prepared according to the following formula.

	Per cent.	Parts by weight
Premix B Example III	31.27	80.00
Yeast	4.72	12.07
Sugar	1.35	3.45
Water	19.81	50.69
Bread flour	39.08	100.00
Whole egg	3.77	9.66

[0045] A 225 pounds batch of each formula was prepared using the straight dough method. The croissants were prepared according to the following steps.

[0046] The yeast and sugar were dissolved in the water and mixed with the egg at 80° F. The flour and premix were added to the above mixture and mixed until the dough was developed, e.g. about 8 minutes. The dough was put on a croissant laminating machine. The dough was retarded in a 40° F. cooler for 3 hours. The dough was sheeted to desired thickness, cut into triangles and rolled. The dough was proofed at 80° F. for 1-1/2 hours. The croissants were baked at 375° F. for 12 minutes. The baked product was cooled, frozen and packaged.

[0047] The frozen product was reconstituted as follows: A 600 watt microwave oven was operated on high setting. Product was placed in the microwave for 55 seconds. The product had minimal staling following the microwave reheating. A conventional oven was preheated to 300° F. Product was placed in the oven to thaw and heat at 300° F. for 6 minutes.

### EXAMPLE XIII

[0048] Microwaveable white bread was prepared using the following formulation.

	Parts by Weight
Premix of B Example VIII	77.38
Budweiser yeast	11.48
Sugar	3.28
Water	53.77
General Mills all trumps high gluten flour	100.00

[0049] Five pounds of bread were made using the straight dough method. The bread was prepared according to the following steps.

[0050] The yeast and sugar were dissolved in the water at 80° F. The flour and the premix were added to the above mixture and mixed until the dough was developed, e.g. approximately 4 minutes on medium speed. The dough was weighed into 5oz. loaf pans and proofed for 1 hour at 100° F. The dough was cooked in a rotating rack oven for 18 minutes at 375° F. The bread was cooled at room temperature for 1 hour. The bread was frozen at 10° F. and packaged for storage.

[0051] A loaf of the frozen bread was reconstituted in a microwave oven on high setting for 1 minute. Minimal staling was noted. Another loaf of the bread was reconstituted in a conventional oven preheated to 300° F. This frozen loaf was thawed and heated at 300° F. for 8 minutes. Another loaf of the frozen bread was thawed and served at room temperature.

#### EXAMPLE XIV

[0052] Microwaveable flour tortillas were prepared according to the following formula.

	Parts by Weight
Flour	100.00
Water	39.93
Shortening	4.95
Premix B Example II	20.13

[0053] A 165 pound batch was prepared with the straight dough method. The tortillas were prepared using the following steps:

The flour and premix were combined. The shortening was then added and combined. Water was added and mixed for 9 minutes. The dough was rolled and made into tortillas on a tortilla machine. The tortillas were baked for 1-1/2 minutes on a continuous belt oven at 400° F. The product was then cooled, frozen and packaged.

[0054] Product was reconstituted in a 600 watt microwave oven on high setting for 30 seconds. Minimal staling was noted. Product was reconstituted in a conventional oven, preheated to 350° F, thawed and heated for 2 minutes at 350° F.

#### EXAMPLE XV

[0055] Microwaveable biscuits were prepared using the following formula.

	Parts by Weight
Premix B Example II	58.81
Water	58.81
H&R flour	100.00
Shortening	20.58
Baking soda	2.95
Sodium Acid Phosphate	2.36
Sodium Alum Phosphate	2.36

[0056] A five pound batch of dough was prepared using the following steps:

[0057] The premix and water were mixed and set aside. The flour, baking soda, SAP, and SALT were dry mixed and then added to the shortening with mixing. The premix/water mixture was added to the flour mixture and mixed for 2 minutes. The dough was rolled out to 3/4 inch thick and cut with 2 inch round cutter. The dough pieces were cooked in a rotating rack oven for 14 minutes at 375° F. The cooked biscuits were cooled at room temperature, frozen and packaged.

[0058] The frozen product was reconstituted in a 600 watt microwave oven on high setting for 1 minute. Additional product was reconstituted in a conventional oven which was preheated to 400° F. The product was thawed and heated for 5 minutes at 400° F. Further product was thawed and served.

#### EXAMPLE XVI

[0059] Microwaveable cinnamon rolls were prepared using the following formulation.

	Parts by Weight
Premix B Example III	80.00
Budweiser yeast	20.69
Sugar	17.24
Cinnamon	.15
Water	57.93
General Mills all trumps high gluten flour	100.00

[0060] Five pounds were made using the straight dough method and using the following steps:

[0061] Yeast and the sugar were dissolved into the water at 80° F. The flour and the premix were added to the above mixture and mixed until the dough was developed, e.g. approximately 5 minutes. The dough was rolled out to 1/2 inch thick. The top of dough was brushed with butter, sprinkled with the sugar/cinnamon mixture. The dough was rolled up tightly and cut into pieces 1/2 inch apart and lay flat on pan. The dough was proofed for 1 hour at 100° F. and baked for 20 minutes at 400° F. The rolls were cooled at room temperature, frozen and packaged.

[0062] Some of the frozen rolls were reconstituted in a 600 watt microwave oven for 1 minute on high setting. Additional rolls were reconstituted in a conventional oven preheated to 300° F. The rolls were thawed and heated for 5 minutes at 300° F. Further rolls were thawed and eaten.

#### **EXAMPLE XVII**

[0063] Microwaveable raw pizza dough was prepared using the following formulation.

	Parts by weight
Premix B Example III	81.03
Budweiser yeast	12.07
Sugar	3.45
Water	56.90
General Mills all trumps high gluten flour	100.00

[0064] Five pounds of dough were made using the straight dough method and the following steps:

[0065] Yeast and the sugar were dissolved into the water at 80° F. The flour and the premix were added to the above mixture and mixed until the dough was developed, e.g. approximately 4 minutes. The dough was scaled and rolled out to proper thickness for 5 inch pizza. Pizza toppings were added for 5 inch pizza and frozen.

[0066] A pizza was reconstituted in a 600 watt microwave oven on high setting 2 minutes 30 seconds. Pizza was on susceptor board for browning. Minimal staling was noted. Another of such pizzas was reconstituted in a conventional oven preheated to 400° F. The pizza was cooked for 15 minutes at 400° F.

#### **EXAMPLE XVIII**

[0067] Microwaveable extruded dough was prepared using the following formulation.

	Parts by Weight
Premix B Example III	77.38

(continued)

	Parts by Weight
Budweiser yeast	11.48
Sugar	3.28
Water	53.77
General Mills all trumps high gluten flour	100.00

[0068] 245 pounds of dough were made using the straight dough method and the following steps:

[0069] Yeast and the sugar were dissolved in the water at 80° F. The flour and the premix were added to the above mixture and mixed until the dough was developed, e.g. approximately 5 minutes. The dough was added to a Rheon Coextruder to form 4oz pieces that included 55% dough and 45% meat filling. the product was proofed for 1 hour at 100° F. The proofed product was cooked at 325° F. for 5.8 minutes with 100lbs steam in a continuous belt air impingement oven. The cooked product was cooled for 1 hour at room temperature. The cooked product was frozen and packaged.

[0070] Frozen product was reconstituted in a 600 watt microwave oven for 1 minute 15 seconds on high setting. Minimal staling was noted. Frozen products was reconstituted in a conventional oven preheated to 300° F. The product was thawed and heated at 300° F. for 12 minutes.

#### EXAMPLE XIX

[0071] Microwaveable pita bread was prepared according to the following formulation.

	Parts by Weight
Premix B Example III	15.00
Budweiser yeast	2.50
Water	62.00
Flour	100.00

[0072] 180 pounds of dough were made with straight dough method using the following steps:

[0073] The yeast was dissolved into the water at 80° F. The flour and the premix were added to the above mixture and mixed until the dough was developed, e.g. approximately 6 minutes. The dough was formed on the Pita bread machine and then proofed for 30 minutes at 100° F. The proofed produce was baked on a continuous oven for 2 minutes. The baked product was cooled for 30 minutes at room temperature. The cooled product was sliced, frozen and packaged.

[0074] The frozen product was reconstituted in a 600 watt microwave oven on high setting 600 watt oven for 30 seconds. Minimal staling was noted. Pita bread was filled with meat and heated in a 600 watt microwave oven on high setting for 1 minute 15 seconds.

#### EXAMPLE XX

[0075] Microwaveable bagels were prepared according to the following formulation.

	Parts by Weight
Premix B Example II	48.31
Flour	100.00
Sugar	3.46

(continued)

	Parts by Weight
Malt	1.37
Salt	.84
Yeast	7.84
Water	60.42

[0076] A 222 pound batch was made using the straight dough method and the following steps:

[0077] The yeast and sugar were dissolved in the water. The remaining ingredients were added to the mixture and mixed until the dough was developed, e.g. approximately 12 minutes. The dough was formed into a bagel on a bagel forming machine. The bagels were retarded in a 40° F. cooler for 12 hours. The dough was proofed for 1 hour at 100° F. The proofed dough was cooked in a stationary oven for 15 minutes at 400° F. and cooled for 1 hour at room temperature. The product was sliced using an automatic slicer. The product was frozen to 10° F. and packaged.

[0078] The frozen bagels were reconstituted in a 600 watt microwave oven on high setting with 600 watt oven for 45 seconds. Minimal staling was noted. Additional bagels were reconstituted in a conventional oven. The bagels were thawed and heated at 300° F. for 5 minutes. Further bagels were thawed and served.

#### EXAMPLE XXI

[0079] A complete dry bread mix was prepared suitable for use in making white bread according to the following formulations.

Dry shortening	6.00%	18.00%
NFDM	0.10%	4.00%
Dry eggs	4.00%	.10%
Cornstarch	0.00%	3.00%
Distilled Monoglyceride, Lecithin	0.00%	3.00%
Salt	0.00%	3.00%
Monocrystalline Cellulose	0.00%	2.00%
Dextrose	0.00%	12.00%
Sugar	12.00%	10.00%
Flour	<u>77.90%</u>	<u>54.90%</u>
	100.00%	100.00%

[0080] The dry mix was prepared by combining the non-fat dry milk and the dry eggs. The shortening was then combined with these protein materials and thoroughly mixed. Next, the other dry ingredients were added with thorough mixing.

[0081] Bread was prepared from each of the dry mixes, A and B, by adding 0.35 parts yeast and 1.65 parts water to 5.35 parts of the respective dry mix. Sufficient mixing was carried out to develop the dough. Dough portions were then placed in bread pans and baked in a conventional oven. The baked bread loaves were cooled and later reheated in a microwave oven. Commercially available bread loaves were similarly heated in the microwave oven. Significant staling and toughening was noted in the commercial bread loaves, whereas, very little staling and toughening was noted in the loaves prepared from dry mixes A and B.

#### EXAMPLE XXII

[0082] A raw pie dough crust was prepared by combining 1.76 parts milk powder and 1.76 parts whole egg solids. 26 parts shortening was then combined with the protein mixture with thorough mixing. Next, 47.8 parts flour, 0.23 parts

cornstarch, 0.02 parts of a commercially available distilled monoglyceride and lecithin mixture, and 0.01 parts microcrystalline cellulose. The dry ingredients were thoroughly and uniformly mixed, then 20.8 parts water were mixed into the dry ingredients and mixed until the pie dough was adequately developed. The dough was then formed into a pie shell and frozen. The frozen pie shell was later removed and cooked in a microwave oven resulting in a cooked pie shell having excellent textural characteristics.

### Claims

1. A method for preparing flour-based products to be heated in a microwave oven, in which a protein material selected from the group consisting of egg protein, milk protein and soy protein is combined with shortening and mixed with flour, characterized in that the selected protein material is first combined with the shortening and the protein/shortening combination is then mixed with the flour to form a pre-mix including 4.5 to 25 parts protein, 7 to 55 parts shortening, and 14 to 55 parts flour.
2. A method as claimed in Claim 1 in which up to 20 parts of dextrose are combined with the protein/shortening combination, flour, and other ingredients to form the premix.
3. A method as claimed in Claim 2 in which the premix includes 0 to 5 parts dried whole eggs and 22 to 55 parts high gluten flour.
4. A method as claimed in Claim 1 or Claim 2 in which the flour is high-gluten flour.
5. A method as claimed in any of the preceding claims in which the shortening is dried shortening.
6. A method as claimed in any of the preceding claims in which the protein material includes 0 to 2.35 parts egg protein.
7. A method as claimed in any of the preceding claims in which a dough is formed by combining flour, water and the premix, which dough also contains yeast.
8. A method for preparing a complete mix for flour-based products to be heated in a microwave oven, in which a protein material selected from the group consisting of egg protein, milk protein and soy protein is combined with shortening and mixed with flour, characterized in that the selected protein material is first combined with the shortening and the protein/shortening combination is then mixed with the flour and other dry ingredients to form a dry mixture including 4.5 to 25 parts protein, 7 to 55 parts shortening, 14 to 55 parts flour, yeast, and finally water is added to the dry mixture in an amount of 20 to 35 parts, all amounts being expressed as parts per 100 of the complete mix.

### Patentansprüche

1. Verfahren zur Herstellung von Produkten auf Mehlbasis, die in einem Mikrowellenherd erhitzt werden sollen, bei dem ein Proteinmaterial ausgewählt aus der Gruppe bestehend aus Eiweißprotein, Milchprotein und Sojaprotein mit Backfett kombiniert und mit Mehl vermischt wird, dadurch gekennzeichnet, daß das gewählte Proteinmaterial zunächst mit dem Backfett kombiniert und dann die Protein/Backfett-Kombination mit dem Mehl gemischt wird, so daß eine Vormischung entsteht, die 4,5 bis 25 Teilen Protein, 7 bis 55 Teile Backfett und 14 bis 55 Teile Mehl enthält.
2. Verfahren nach Anspruch 1, bei dem bis zu 20 Teile Dextrose mit der Protein/Backfett-Kombination, Mehl und anderen Zutaten kombiniert werden, um die Vormischung zu bilden.
3. Verfahren nach Anspruch 2, bei dem die Vormischung 0 bis 5 Teile getrocknete ganze Eier und 22 bis 55 Teile Mehl mit hohem Glutengehalt enthält.
4. Verfahren nach Anspruch 1 oder Anspruch 2, bei dem das Mehl ein Mehl mit hohem Glutengehalt ist.
5. Verfahren nach einem der vorherigen Ansprüche, bei dem das Backfett getrocknetes Backfett ist.
6. Verfahren nach einem der vorherigen Ansprüche, bei dem das Proteinmaterial 0 bis 2,35 Teile Eiweißprotein enthält.

7. Verfahren nach einem der vorherigen Ansprüche, bei dem ein Teig durch Kombinieren von Mehl, Wasser und der Vormischung gebildet wird, wobei der Teig auch Hefe enthält.
8. Verfahren zur Herstellung einer Fertigmischung für Produkte auf Mehlbasis, die in einem Mikrowellenherd erhitzt werden sollen, wobei ein Proteinmaterial ausgewählt aus der Gruppe bestehend aus Eiweißprotein, Milchprotein und Sojaprotein mit Backfett kombiniert und mit Mehl vermischt wird, dadurch gekennzeichnet, daß das ausgewählte Proteinmaterial zuerst mit dem Backfett kombiniert und die Protein/Backfett-Kombination dann mit dem Mehl und anderen Trockenzutaten vermischt wird, so daß eine Trockenmischung entsteht, die 4,5 bis 25 Teile Protein, 7 bis 55 Teile Backfett, 14 bis 55 Teile Mehl und Hefe enthält, und der Trockenmischung schließlich Wasser in einer Menge von 20 bis 35 Teilen zugegeben wird, wobei alle Mengen als Teile pro 100 der Fertigmischung zu verstehen sind.

#### Revendications

1. Méthode pour préparer des produits à base de farine devant être chauffés dans un four micro-ondes, dans laquelle une matière protéique sélectionnée dans le groupe consistant en matière protéique de l'oeuf, matière protéique du lait, ou matière protéique du soja est combinée à une matière grasse et mélangée à de la farine, caractérisée en ce que la matière protéique sélectionnée est d'abord combinée à la matière grasse et la combinaison matière protéique/matière grasse est ensuite mélangée à la farine pour former un pré-mélange comportant de 4,5 à 25 parties de matière protéique, 7 à 55 parties de matière grasse, et 14 à 55 parties de farine.
2. Méthode selon la revendication 1, dans laquelle jusqu'à 20 parties de dextrose sont combinées à la combinaison matière protéique/matière grasse, à la farine, et aux autres ingrédients pour former le pré-mélange.
3. Méthode selon la revendication 2, dans laquelle le pré-mélange comporte de 0 à 5 parties d'oeufs entiers séchés et 22 à 55 parties de farine à haut contenu de gluten.
4. Méthode selon la revendication 1 ou la revendication 2, dans laquelle la farine est une farine à haut contenu de gluten.
5. Méthode selon l'une quelconque des revendications précédentes dans laquelle la matière grasse est une matière grasse séchée.
6. Méthode selon l'une quelconque des revendications précédentes dans laquelle la matière protéique comporte de 0 à 2,35 parties de matière protéique de l'oeuf.
7. Méthode selon l'une quelconque des revendications précédentes, dans laquelle une pâte est formée en combinant de la farine, de l'eau et le pré-mélange, laquelle pâte contient également de la levure.
8. Méthode pour préparer un mélange complet pour des produits à base de farine devant être chauffés dans un four micro-ondes, dans laquelle une matière protéique sélectionnée dans le groupe consistant en matière protéique de l'oeuf, matière protéique du lait, ou matière protéique du soja est combinée à une matière grasse et mélangée à de la farine, caractérisée en ce que la matière protéique sélectionnée est d'abord combinée à la matière grasse et la combinaison matière protéique/matière grasse est ensuite mélangée à la farine et d'autres ingrédients secs pour former un mélange sec comportant de 4,5 à 25 parties de matière protéique, 7 à 55 parties de matière grasse, 14 à 55 parties de farine, de la levure, et finalement de l'eau est ajoutée au mélange sec en une quantité de 20 à 35 parties, toutes les quantités étant exprimées en parties pour 100 du mélange complet.